

THE COMMISSIONER OF PATENTS AND TRADEMARKS, Washington, D.C. 20231

Enclosed for filing is the patent application of Inventor(s):  
LUCIEN F.A. DOUVEN, SIMON E. KADIJK AND HENDRIK POEL

For: SHAVING APPARATUS

**ENCLOSED ARE:**

- ☒ Appointment of Associates;  
☒ Information Disclosure Statement, Form PTO-1449 and copies of documents listed therein;  
☒ Preliminary Amendment;  
☒ Specification (9 Pages of Specification, Claims, & Abstract);  
☒ Declaration and Power of Attorney:  
 (2 Pages of a ☒ fully executed ☐ unsigned Declaration);  
☒ Drawing (3 sheets of ☐ informal ☒ formal sheets);  
☒ Certified copy of EUROPEAN application Serial No. 97301059.8;  
☒ Authorization Pursuant to 37 CFR §1.136(a)(3)  
☒ Other: CITATION OF RELATED CASES;  
☒ Assignment to U.S. PHILIPS CORPORATION.

**FEE COMPUTATION**

CLAIMS AS FILED				
FOR	NUMBER FILED	NUMBER EXTRA	RATE	BASIC FEE - \$790.00
Total Claims	- 20 =	0	X \$22 =	0.00
Independent Claims	- 3 =	0	X \$82 =	0.00
Multiple Dependent Claims, if any			\$270 =	0.00
TOTAL FILING FEE . . . . .			=	\$790.00

Please charge Deposit Account No. 14-1270 in the amount of the total filing fee indicated above, plus any deficiencies. The Commissioner is also hereby authorized to charge any other fees which may be required, except the issue fee, or credit any overpayment to Account No. 14-1270.

☐ Amend the specification by inserting before the first line as a centered heading --Cross Reference to Related Applications--; and insert below that as a new paragraph --This is a continuation-in-part of application Serial No. , filed .--, which is herein incorporated by reference--.

**CERTIFICATE OF EXPRESS MAILING**

Express Mail Mailing Label No. EM352554079  
 Date of Deposit 3/13/98  
 I hereby certify that this paper and/or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Typed Name

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 Signature

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

LUCIEN F.A. DOUVEN ET AL

PHB 34,140

Serial No.

Filed: Concurrently

SHAVING APPARATUS

Honorable Commissioner of Patents and Trademarks  
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Prior to calculation of the filing fee and examination,  
please amend the above-identified application as follows:

IN THE SPECIFICATION

Page 1, before line 1, insert as a centered heading:

--BACKGROUND OF THE INVENTION--;

between lines 19 and 20, insert as a centered  
heading:

--SUMMARY OF THE INVENTION--;

Page 2, between lines 15 and 16, insert as a centered heading:

--BRIEF DESCRIPTION OF THE DRAWINGS--;

between lines 25 and 26, insert as a centered heading:

--DESCRIPTION OF THE PREFERRED EMBODIMENTS--.

IN THE ABSTRACT

Page 9, before line 5, delete in its entirety and substitute:

--ABSTRACT OF THE DISCLOSURE--;

line 7, delete "(22)"; delete "(18)";  
line 11, delete "Figure 3."

IN THE CLAIMS

Please amend claim 4 as follows:

Claim 4, line 1, change "any preceding claim" to --Claim 1--.

REMARKS

This amendment is submitted to place the application in proper U.S. format. Entry is respectfully solicited.

Respectfully submitted,

By Ernestine C. Bartlett  
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Attorney  
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February 4, 1998

## DESCRIPTION

### SHAVING APPARATUS

5           This invention relates to a shaving apparatus of the type having a shaving head with at least one rotary cutting assembly which comprises a rotary cutter housed within a guard.

10           In a conventional shaving apparatus of the type described above, the rotary cutter is housed within a substantially cylindrical guard having a closed end face for contact with the skin. Hair-entry apertures are provided around the outer edge of this face, and the blades of the rotary cutter rotate within the guard adjacent these apertures. The cutter assembly has a spring mounting within the shaving head, so that the guard projects beyond a peripheral face of the shaving head.

15           When pressure is applied to the shaving head against the operator's face during use, the cutter assemblies may retract until they reach a stop, and any further pressure increase is distributed over the guards and the peripheral face of the shaving head. An assembly of this type is described in EP-0-231 966.

20           It is an object of the invention to improve the shaving characteristics of a rotary head shaving apparatus over the wide range of forces which may be applied to the shaver during use.

25           According to the invention, there is provided a shaving apparatus comprising a head assembly which houses at least one cutter assembly, the cutter assembly comprising a rotary cutter having cutter blades housed within a guard, the guard being provided with hair-entry apertures arranged in an annular ring, wherein a peripheral surface of the head assembly comprises, for the or each cutter assembly, a first portion inside the annular ring and a second portion outside the annular ring, the first and second portions being fixed with respect to each other (when the shaving apparatus is assembled, if supplied as a kit of parts).

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In the shaving apparatus of the invention, the area within the ring of hair-entry apertures comprises a fixed surface which defines part of the force-absorbing peripheral surface of the head assembly. Thus, an increased force absorbing surface is provided which is found to improve the shaving characteristics over a wide range of applied forces, as will be explained in the following description.

Preferably, the rotary cutter and the first portion of the peripheral surface are fixed to the body of the shaving apparatus, and the guard is fixed to a removable cover portion of the housing. In this way, the removal of the cover portion simultaneously exposes the guard and the rotary cutter or cutters for subsequent cleaning. Preferably, a cut-off switch is provided so that the rotary cutters may not be operated when the removable cover has been removed.

The guard is preferably slidably received within the removable cover, and the rotary cutter is resiliently biased towards the guard. The shaving apparatus preferably comprises two or three cutter assemblies.

The invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a front view of a shaving apparatus to which the invention may be applied;

Figure 2 is a sectional view along the line X-X in Figure 1 to show in greater detail one example of a conventional rotary shaving head;

Figure 3 is a sectional view taken on the line X-X in Figure 1 to show in greater detail a rotary shaving head of the invention; and

Figure 4 is a graph representing shaving characteristics over a range of applied pressures.

The shaving apparatus shown in Figure 1 comprises a body 1 and a shaving head 2, the head 2 housing three cutter assemblies 3. Each cutter assembly 3 comprises an external guard 4 provided with hair-entry apertures 6 arranged in an annular ring, and an internal rotary cutter 8 (shown in Figures 2 and 3) which is rotatable relative to the guard 4. The rotary cutters 8 are driven by means of an electric motor which is accommodated in the body 1 of

the shaving apparatus.

The features described so far are present in both a conventional rotary shaving apparatus and in the shaving apparatus of the invention.

Figure 2 shows in greater detail one example of a conventional cutter assembly 3. The shaving head 2 comprises a shaving head housing 10 having apertures for receiving the cutter assemblies 3. Each cutter assembly 3, comprising the guard 4 and the rotary cutter 8, is retained in the shaving head 2 by a retaining plate 12 which releasably engages the housing 10. The guard 4 is detachably secured to the retaining plate 12, and the retaining plate 12 is secured to the housing 10 by a fixing screw 14. A resilient element in the form of a helical spring 16 is compressed between the retaining plate 12 and the head of the fixing screw 14, which enables the retaining plate 12 to move to a limited extent relatively to the housing 10. As a result, the guard 4 is moveable relatively to the housing 10 substantially perpendicularly to the peripheral face 18 of the housing 10. The fixing of the retaining plate 12 within the housing 10 is arranged such that the closed end face of each guard 4 projects beyond the peripheral face 18 of the housing 10.

The rotary cutters 8 are each engaged by an associated drive shaft 20 which centres the respective rotary cutter 8. The shaft itself is retractable along the direction of its axis, to enable the retraction of cutter assembly while it is being driven. The guard 4 has hair-entry apertures 6 disposed in a ring at the outer edge of the end face of guard 4, and has a sunk portion, within the ring defined by the hair-entry apertures 6.

The cutter assembly 3 of the invention is shown in detail in Figure 3, in which the same reference numerals have been used as in Figure 2 for similar components. The guard 4 used in the cutter assembly 3 of the invention again has an annular series of hair-entry apertures 6, but the guard 4 has a central opening within the ring defined by the apertures 6. A fixed supporting disc 22 is provided in this aperture, and may be considered to define a portion of the peripheral face 18 of the shaving head. Thus, a first portion of the peripheral face 18 of the head 2 is defined by the disc 22, and a second portion is defined

by the housing 10.

The supporting disc 22 may have a raised portion around its circumference, which may be arranged to be level with the second portion of the face 18 outside the ring of hair-entry apertures 6. Thus, the outer edge of the disc 22 provides a skin-contact surface.

The disc 22 is fixed to the body 1 of the shaving apparatus through a spindle 24, which also acts as a central support for the drive mechanism of the rotary cutter 8. This drive mechanism comprises a gear wheel 26 which is coupled to the drive motor of the shaving apparatus by a mechanism which is not shown in the drawings. The gear wheel 26 has a series of internal teeth 27 which engage external teeth 29 on a coupling member 28 which transmits rotational torque from the gear wheel 26 to the rotary cutter 8. The engagement between the coupling member 28 and the gear wheel 26 enables limited movement of the coupling member 28 along the axis of the spindle 24, and the coupling member 28 is biased towards the peripheral face 18 by a spring 30.

The rotary cutter 8 is coupled to the end of the coupling member 28 by any appropriate bearing, which should enable some movement of the rotary cutter 8 in a plane perpendicular to the axis of the spindle 24. The rotary cutter 8 is centred through the engagement of the cutter blades in the channel defined by the annular guard 4.

The improved shaving response of the shaving apparatus of the invention will now be described. The overall pressing force applied to a shaving apparatus in use is distributed over the cutter assemblies and over the peripheral surface of the shaving head. In a conventional shaving head, a raised rim may surround each cutter assembly which acts as a skin-tautening rim, and this rim also acts as a force-absorbing surface. The force on the skin at the location of the hair-entry apertures determines the level of bulging of the skin into the hair-entry apertures. This is an important parameter to control, since some skin bulging is desirable for a close shave, whereas excessive bulging will result in discomfort or irritation to the skin. Preferably,

the level of bulging should be independent of variations in the pressing force applied by the user (hereinafter referred to as "shaving force").

In Figure 4, curve 40 shows the ideal bulging B of the skin as a function of the shaving force F applied to the shaving apparatus, and which should be approximated to by a practical apparatus. For low shaving forces, the degree of bulging should increase rapidly, after which it should remain as constant as possible for higher shaving forces. To approximate to this curve, the cutter assemblies (of both Figures 2 and 3) are arranged to absorb all of the shaving force in the case of low shaving forces, and the shaving head housing absorbs a proportion of the shaving force in the case of high shaving forces, when the cutter assemblies have retracted.

This optimum response can not be achieved totally in practice. For example, a conventional shaving apparatus, such as shown in Figure 2, has the response shown by curve 44. The suspension of the cutter assemblies within the shaving head does ensure that only the cutter assemblies are in contact with the skin for low shaving forces, and this gives rise to the relatively rapid initial rise in bulging. However, the central portion of each cutter assembly absorbs some of the shaving force even for low shaving forces, which limits the initial rise in bulging. For higher overall shaving forces, the fixed peripheral surface of the housing then absorbs a further proportion of the force increase, in such a manner that the bulging increases less rapidly. However, the flat ideal response of curve 40 cannot be approached, particularly because of the small area of the skin-tautening rims in the conventional apparatus.

The apparatus according to the invention has the response shown as curve 46 which approximates much more closely to the desired ideal response. For low shaving forces, the annular ring of hair entry apertures absorbs the total shaving force, so that the bulging rises rapidly to the selected optimal value for shaving. For higher shaving forces, the provision of a force absorbing surface within the rim of hair-entry apertures provides a greater surface for distributing the additional shaving force, and provides support for the skin both inside and outside the ring of apertures. Consequently, the additional applied



shaving force is distributed over the fixed peripheral face (face 18 and disc 22), and the pressing force on the annular ring of hair entry apertures remains substantially constant.

The shaving apparatus of the invention, as shown in Figure 3, also simplifies the cleaning operation of the shaving head assembly. In particular, the rotary cutter 8 and the coupling member 28 are secured to the body 1 of the shaving apparatus and thereby remain in place when the head 2 is removed. The guard 4 is secured to the head 2 to allow limited movement of the guard with respect to the head 2 by a suitable coupling (not shown in the drawings). Thus, removal of the head 2 exposes the rotary cutter 8 which remains connected to the body 1 of the shaving apparatus, and also exposes the hair-entry apertures 6 which are coupled to the removed head 2. The supporting disc 22 remains secured to the body 1 of the shaving apparatus. A cut-off switch is required to ensure that the rotary cutter 8 cannot be operated when the head assembly 2 has been removed, and an appropriate form of cut-off switch will be apparent to those skilled in the art.

The cutter assemblies in the shaving apparatus of the invention are independently sprung, and the suspension of the cutter assemblies will be designed to achieve the best shaving characteristics, by appropriate selection of the spring stiffness and pre-tension. For example, the ring of hair-entry apertures may have an inner diameter of 14mm and an outer diameter of 20mm. For this size of cutter assembly, a spring pre-tension of approximately 0.5N is appropriate, so that for shaving forces of less than 0.5N, the entire shaving force is absorbed by the ring of hair-entry apertures. A shaving force of approximately 0.5N is required to obtain the ideal level of bulging into the hair-entry apertures. A low spring stiffness is desired so that the cutter assembly retracts quickly once the ideal level of bulging has been obtained. Consequently, the peripheral face of the shaving head housing absorbs any further increase in the shaving force, and the force on the ring of hair-entry apertures remains substantially constant. For example, a spring stiffness of 0.1 to 0.2 N/mm is appropriate.

Manipulation of the spring characteristics will influence the response of Figure 4. Furthermore, the design of the inner supporting disc 22 also influences the shaving response. For example, the amount of projection of the guard 4 beyond the face 18 may be different to the projection of the guard beyond the disc 22. Typically, the projection of the ring of hair-entry apertures 6 when the guard is fully extended is 0.5 to 1.0mm. The supporting disc 22 may project slightly beyond the face 18, for example with the ring of hair-entry apertures 6 of the guard 4 projecting 0.9mm beyond the face 18 and 0.7mm beyond the rim of the supporting disc 22.

The shape of the central supporting disc may also influence the response of Figure 4, and may be designed to optimise the skin-tautening effect of the disc during shaving.

## CLAIMS

1. A shaving apparatus comprising a head assembly which houses at least one cutter assembly, the cutter assembly comprising a rotary cutter having cutter blades housed within a guard, the guard being provided with hair-entry apertures arranged in an annular ring, characterised in that the peripheral surface of the head assembly comprises, for the or each cutter assembly, a first portion inside the annular ring and a second portion outside the annular ring, the first and second portions being fixed with respect to each other.

2. A shaving apparatus as claimed in claim 1, wherein a portion of the head assembly is removable, and wherein, for the or each cutter assembly, the rotary cutter and the first portion of the peripheral surface is fixed to the shaver body, and the guard is secured to the removable portion of the head assembly.

3. A shaving apparatus as claimed in claim 2, wherein a cut-off switch is provided to prevent the operation of the shaving apparatus when the portion of the head assembly is removed.

4. A shaving apparatus as claimed in any preceding claim, wherein the rotary cutter is resiliently biased against the guard, and the cutter assembly is retractable with respect to the head assembly against the resilient bias.

## ABSTRACT

**SHAVING APPARATUS**

5           A shaving apparatus has a head assembly 2 which houses rotary cutters  
8, and guards 4 which are provided with an annular series of hair-entry  
apertures 6. A fixed supporting surface is provided inside (22) and outside (18)  
the ring of apertures, to provide support when shaving with large applied  
pressure.

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Figure 3.

1/3

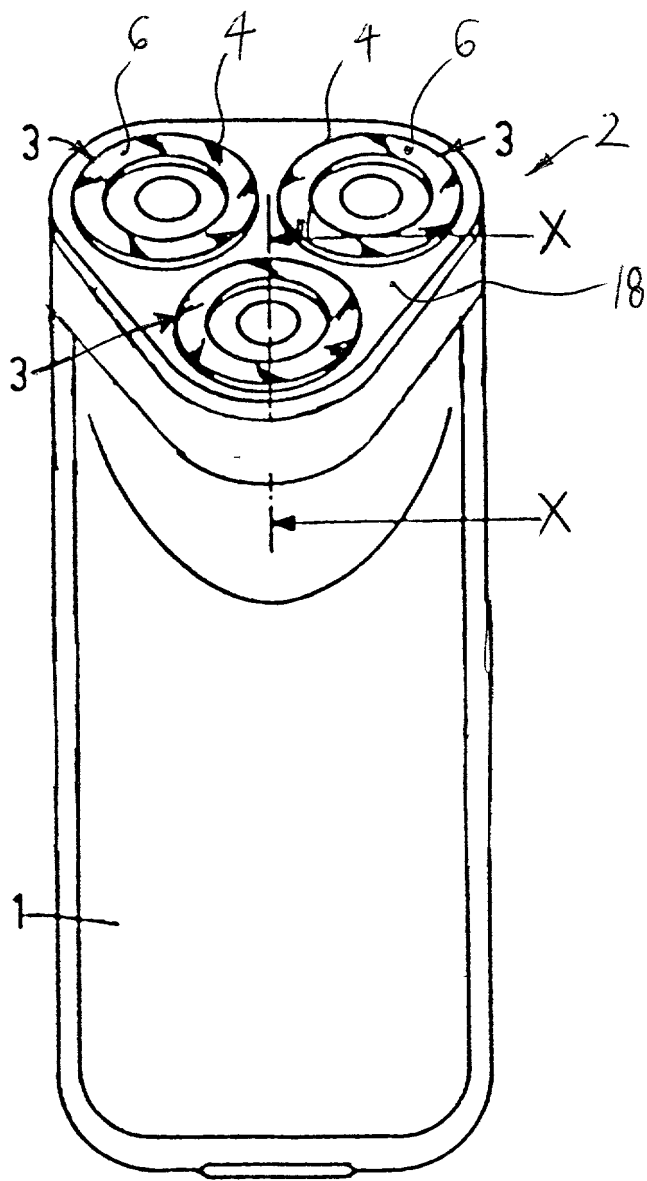
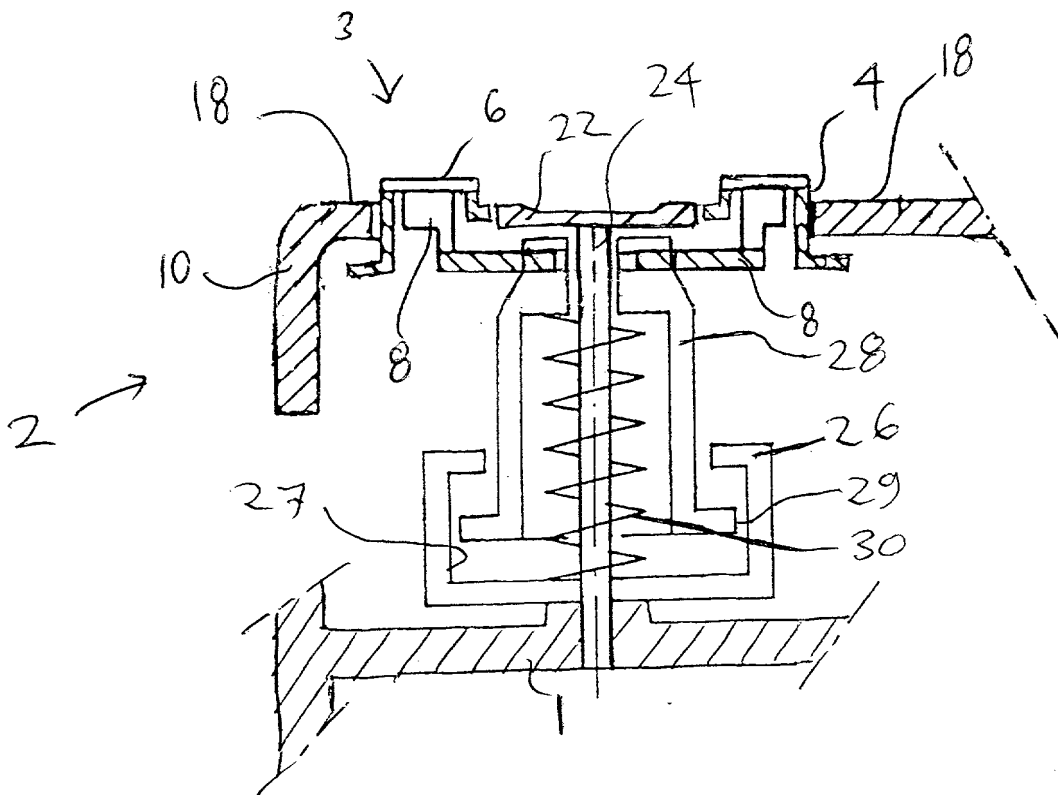
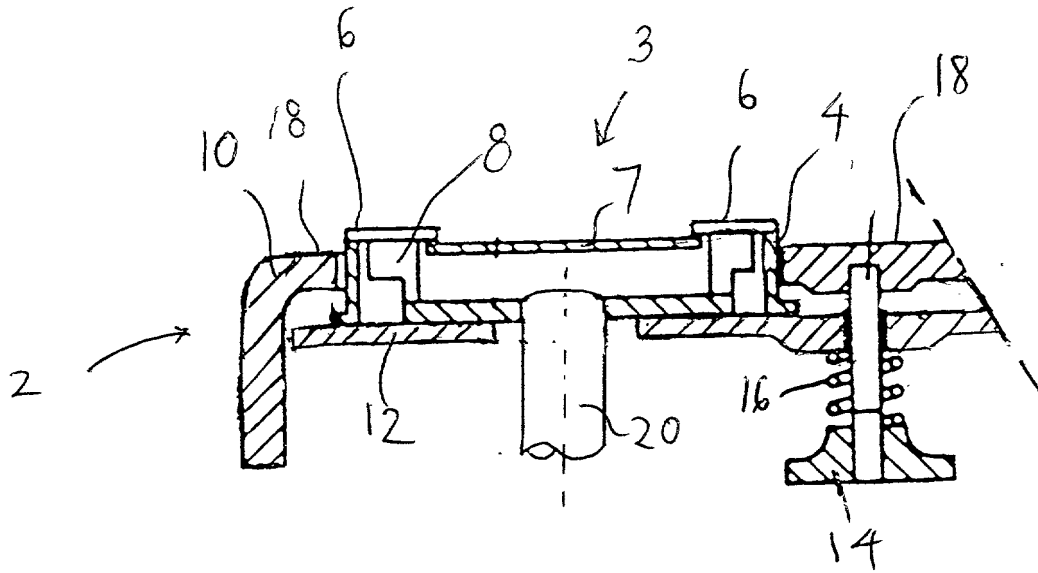


FIG 1



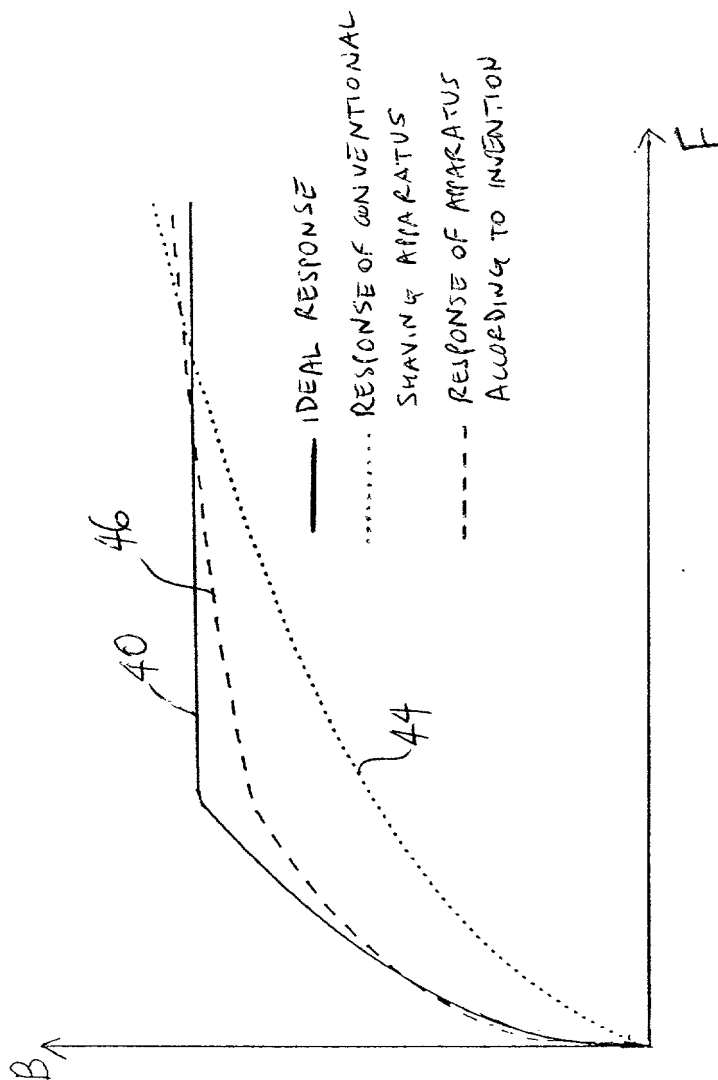


FIG 4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

LUCIEN F.A. DOUVEN ET AL

PHB 34,140

Filed: CONCURRENTLY

SHAVING APPARATUS

Honorable Commissioner of Patents and Trademarks  
Washington, D.C. 20231

APPOINTMENT OF ASSOCIATES

Sir:

The undersigned Attorney of Record hereby revokes all prior appointments (if any) of Associate Attorney(s) or Agent(s) in the above-captioned case and appoints:

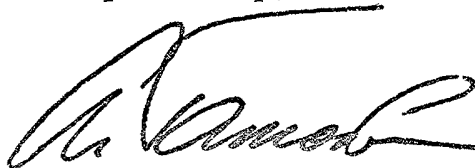
**ERNESTINE C. BARTLETT**

**(Registration No. 22,861)**

c/o U.S. PHILIPS CORPORATION, Intellectual Property Department, 580 White Plains Road, Tarrytown, New York 10591, his Associate Attorney(s)/Agent(s) with all the usual powers to prosecute the above-identified application and any division or continuation thereof, to make alterations and amendments therein, and to transact all business in the Patent and Trademark Office connected therewith.

ALL CORRESPONDENCE CONCERNING THIS APPLICATION AND THE LETTERS PATENT WHEN GRANTED SHOULD BE ADDRESSED TO THE UNDERSIGNED ATTORNEY OF RECORD.

Respectfully,



Algy Tamoshunas, Reg. 27,677  
Attorney of Record

Dated at Tarrytown, New York  
on February 4, 1998.

S:\BT\MT04BTP0.CN0

RECEIVED FEB 10 1998



# DECLARATION AND POWER OF ATTORNEY

Sole/Joint

Attorney's Docket No:  
PHB34140US

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

SHAVING APPARATUS

the specification of which (check one)



is attached hereto



was filed on ..... as Application Serial No: ..... and was amended on

(if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56 (a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

## PRIOR FOREIGN APPLICATION(S)

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY Claimed Under 35 U.S.C. 119
EUROPE	97301059.8	19-02-1997	Yes <u>X</u> No _____
			Yes _____ No _____

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35 United States Code §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

## PRIOR UNITED STATES APPLICATION(S)

APPLICATION SERIAL NUMBER	FILING DATE	STATUS (PATENTED, PENDING, ABANDONED)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

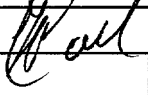
**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

Jack E. Haken, Reg. No 26,902  
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SEND CORRESPONDENCE TO: Corporate Patent Counsel U.S. Philips Corporation 580 White Plains Road Tarrytown, New York 10591	DIRECT TELEPHONE CALLS TO: (Name and telephone number)  (914) 332-0222
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Dated: 17TH DECEMBER 1997		Inventor's Signature: [Signature]	
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Dated:		Inventor's Signature	
FULL NAME OF INVENTOR	Last name	First Name	Middle Name:
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Dated:		Inventor's Signature	
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Dated:		Inventor's Signature:	
FULL NAME OF INVENTOR:	Last name	First Name:	Middle Name:
RESIDENCE & CITIZENSHIP	City	State or Foreign Country:	Country of Citizenship:
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